

they are not immediately susceptible to chemical change. What is the criterion of life? There is none. It seems to me then that the question I have propounded does not admit of any positive answer in the present state of our knowledge.

A problem, perhaps somewhat scholastic, which once vexed the souls of biologists was:—Whether life was the cause of organisation or organisation of life. What is to be our answer if our starting point is no more than a possible “explosive”?

“Effects of Thyroid Feeding on Monkeys.” By WALTER EDMUNDS.  
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The experiments were made altogether on nine monkeys; from them, however, it would be safer to exclude three: two because pathological conditions were found in their lungs after death, and one because the animal died in so short a time (seven days) after the commencement of the treatment.

There remain then six experiments for consideration.

The thyroid preparations administered were either a powder made according to the directions of Mr. Edmund White, or thyrocolloid prepared by the method of Dr. Hutchison.

The doses given were large and corresponded to from one-half to three sheep's thyroids (both lobes) to a monkey daily.

Marked effects were produced by this treatment: the eyes became abnormally prominent; the monkeys lost flesh, became weak, and eventually died.

The symptoms produced may be tabulated as follows: (1) Proptosis, (2) dilatation of pupils, (3) widening of palpebral fissures, (4) erection of hairs on head, (5) hair falling out in patches from various parts of the body, (6) paralysis of one or more limbs, (7) emaciation and muscular weakness, (8) death from asthenia.

With respect to these symptoms, proptosis, dilatation of pupil, widening of the palpebral fissure and erection of the hairs on the head are effects which are produced by the stimulation of the cervical sympathetic.

As the chief object of these experiments was to determine as to exophthalmos, sketches were made of the monkeys before commencing treatment and also after; eye changes occurred in all the six monkeys, and of four of them sketches exist showing these changes; in two it was not practicable to obtain the second sketches, but there was no doubt about the eye changes in these also.

Exophthalmos, after the administration of thyroid preparations, has been observed before. Bécclère, in a case of myxœdema in man in which excessive doses of thyroid were given by mistake, noticed amongst other symptoms a certain degree of exophthalmos. Ballet and Enriquet, in one of six dogs which were fed on thyroids, found distinct exophthalmos. Cunningham also obtained this symptom in rabbits and monkeys.

As the eye changes can be produced by stimulation of the cervical sympathetic, it seems reasonable to infer that thyroid extract acts in the same manner, and also that the increased secretion of the enlarged and altered thyroid of Graves's disease is in part at least the cause of the exophthalmos that occurs in that affection.

The falling out of the hair in patches and its loosening generally were common symptoms, and were seen in all the monkeys.

As to paralysis, in two of the experiments the hind limbs became paralysed; in one of these cases the treatment was stopped to see if any improvement followed, but it did not, and the animal died in a few days. In another experiment both arms became paralysed; this passed off in two days without the treatment being stopped.

These paralyses have also been noticed before. Bécclère, in the patient referred to above, found one day hemiplegia with aphasia and hemi-anaesthesia, all of which disappeared in a few hours. In thyroidless monkeys, Horsley has twice seen a complete hemiplegia, following an attack of clonic spasms, and passing off in a day or so. In one of my thyroidless monkeys a temporary paresis of one arm occurred.

The symptoms of loss of flesh and muscular weakness occurred in all the experiments, and in all too the animal died, at periods varying from forty to 116 days from the commencement of the treatment.

In two cases the feeding was stopped, but only when the symptoms were well marked; there was no improvement, and the animals died.

The main conclusion arrived at is, that in monkeys thyroid feeding, if large doses are given, produces exophthalmos.

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